

3.0 PROTOCOL FOR CLEANING SAMPLING EQUIPMENT

Overview

The effective cleaning of sampling equipment prevents, minimizes and limits the cross-contamination of samples taken during a sampling trip or between sampling trips. This is particularly important when trace parameters such as trace metals, or trace organic constituents are being sampled. Cleaning is also used to remove manufacturing residues from new equipment and to remove dust and any other foreign substances from equipment that has been in long-term storage.

Cleaning of sampling equipment also helps to prevent the transfer of aquatic invasive species from one water body to another. Aquatic invasive species are organisms that have been introduced into a new aquatic ecosystem and produce harmful impacts on native species biodiversity as well as the human use of these ecosystems such as recreational development and fisheries. Aquatic invasive species can be in the form of fish, invertebrates, reptiles, amphibians, algae, and plant species. Many aquatic invasive species can be unknowingly transferred in residual water found in sampling equipment, or on aquatic plants, watercraft, equipment and related sampling gear such as nets and waders. Simple precautions can prevent the spread of aquatic invasive species from one water body to another.

Clean and inspect all equipment, nets, personal gear such as waders, watercraft, and trailer. **Remove** all plants, animals and mud. **Rinse** using high pressure. Extremely hot tap water is preferable - 50°C (120°F).

Drain all water from sampling equipment and watercraft including the motor, livewell, bilge at the source or on land.

Dry watercraft for at least 5 days in the hot sun (if rinsing is not available). Alternatively, **freeze** all equipment and gear for two or more days, or **soak** all equipment including nets in a 1) table salt water solution (230 g (2/3 cup) of salt to 1 L (1 gallon) water) for 24 hours or 2) undiluted white vinegar for 20 minutes, or 3) diluted household bleach (> 5% sodium hypochlorite at a concentration of 100 ml (~3 ounces) of bleach to 20 L (~5 gallons) of water for at least 60 minutes.

Dispose of unwanted live fish at source. Never transport and release plants, animals, mud or water into another water body.

Sampling equipment should be either disposable (single use only) or subjected to rigorous cleaning procedures (depending on the parameters being sampled) and stored in sealed new plastic bags (e.g., Ziploc) or wrapped in new aluminum foil,

depending on what parameters are sampled. Parafilm (self-sealing, moldable and flexible film) can also be used to cover equipment openings to prevent dust accumulation. It may be necessary to replace the sampler and/or rope on occasion if these become excessively dirty or worn.

All sampling bottles should be obtained from the appropriate analytical laboratory, only single use, remain capped before and after actual sampling and used for one specific sampling procedure. The following cleaning procedures are for all non-disposable sampling equipment excluding sample bottles.

Sources

Alberta Environment (2005 a), Environment Canada and B.C. WLAP (2005 c), Environment Canada (2006 b)

Special safety concerns

Always add acid to water. Use a fume hood if one is available. If not, wear respirators with the appropriate filters for the hazardous chemicals in use (e.g., acids, solvents). Clean equipment in a well-ventilated area, and wear safety glasses and gloves. Consult the MSDS for all chemicals used in the cleaning procedures for information regarding personnel protection, spill cleanup, and medical treatment directions.

At a glance

General considerations

1 A 5% (v/v) solution of hydrochloric acid or a 10% (v/v) solution of nitric acid should be used to soak/rinse equipment that is to be used to collect samples for trace metals analyses. Note: if the equipment is to be used to collect samples for nitrogen analyses then nitric acid should not be used.

cleaning solutions

2 A non-phosphate, laboratory-grade detergent (e.g. Liquinox, Contrad, Extran) should be used to soap-wash equipment. Use a 0.1-2.0 % v/v solution when cleaning between field trips (higher if required) and use a 0.1-0.2 % v/v solution for field cleaning. To limit soap residue accumulation, do not use >0.2 % v/v solution for field-cleaning

3 Note: all containers or equipment for trace organic work must be stainless steel, glass or Teflon.

rinsate blanks

4 Equipment or rinsate blanks can be collected to test whether there is any residual contamination left on the equipment after cleaning. A rinsate blank is a sample of de-ionized water collected after it has been poured over/through the sampling equipment in question. The water used should be of the highest grade to accurately analyze the rinsate blank samples.

5 If methanol is used as a solvent then do not use it on equipment destined to collect samples for total particulate carbon (TPC), particulate organic carbon (POC), and total or dissolved organic carbon (TOC/DOC).

Cleaning equipment for trace inorganic analysis

1 Perform physical removal with brushes and non-phosphate detergent wash. This removes all visible particulate matter and residual oils and grease.

2 Tap water rinse and distilled/de-ionized water rinse. This removes detergent residues.

3 Acid rinse or soak non-metallic sampling equipment. Use either a 5% (v/v) solution of hydrochloric acid or a 10% (v/v) solution of nitric acid. Typically the equipment is subject to either an acid rinse or soak between field trips and an acid rinse when cleaning/decontaminating equipment from the field.

4 *Acid Rinse:* Equipment should be rinsed thoroughly with acid, ensuring that the acid makes contact with all surfaces likely to be in contact with the sample. Ideally this procedure should be conducted in a fume hood

5 *Acid Soak:* Ideally equipment should be soaked for 12-24 hours, but USGS (2005) recommends a 30-minute acid soak. Ideally this procedure should be conducted in a fume hood.

6 Complete multiple distilled/de-ionized water rinses (3-5 rinses). At a minimum the last rinse should be with de-ionized water. To remove all acid residues ensure that the water makes contact with all surfaces likely to be in contact with the sample.

7 Air-dry in a clean area and on a clean non-metal surface. Avoid areas with dust and fumes.

8 Store in new, clean Ziploc-type plastic bags, and/or cover equipment openings with new Parafilm. Mark the date of cleaning and the initials of the cleaning personnel on the bag. Transport the freshly cleaned equipment in a clean vessel and store in a clean environment.

proper disposal **9** Discard the waste (leftover) acid into a clearly marked waste container and store in hazardous waste area for proper disposal. Consult the MSDS for details and do not store acids close to solvents.

Cleaning equipment for trace organic (e.g. hydrocarbon) analysis

1 Perform the physical removal of trace materials with brushes and non-phosphate detergent wash. This removes all visible particulate matter and residual oils and grease. Ideally this process should be conducted in a fume hood.

2 Tap water rinse and distilled/de-ionized water rinse removes detergent residues. Rinse with organic solvents (e.g., acetone, hexane, or methanol). A common procedure is to rinse first with hexane, allow to air dry, rinse again with acetone and then allow the equipment to air-dry again. Equipment should be rinsed thoroughly with the solvent, ensuring that the solvent makes contact with all surfaces likely to be in contact with the sample. Ideally this process should be conducted in a fume hood.

3 Complete multiple distilled/de-ionized water rinses (3-5 rinses). At a minimum the last rinse should be with de-ionized water. To remove all solvent residues ensure that the water makes contact with all surfaces likely to be in contact with the sample.

4 Air-dry in a clean area and on a sanitized surface covered with new (rinsed in hexane/acetone) aluminum foil. Avoid areas with dust and fumes.

5 Cover the equipment with new, clean aluminum foil and store in new Ziploc-type plastic bags. Mark the date of cleaning and the initials of the cleaning personnel on the bag. Transport the freshly cleaned equipment in a clean vessel and store in a clean environment.

*proper
disposal*

6 Discard waste hexane/acetone into a clearly marked container for organic solvents and store in hazardous waste area for proper disposal. Consult the MSDS for details. Do not store acids close to solvents.

Cleaning equipment for specific pieces of equipment: euphotic sampling tube/peristaltic pump tube

1 After use, rinse with de-ionized/distilled or tap water inside and out.

2 Remove foot valve from euphotic tube and soak in 5% HCl.

3 Fill tubing with 5% HCl and let stand for 6-12 hours.

4 Thoroughly rinse the inside of the tubing with de-ionized/distilled water (3-5 times) water. At a minimum the last rinse should be de-ionized water.

5 Re-assemble tubing and store in a clean plastic Ziploc-type bag labeled with date of cleaning and the initials of the cleaning personnel on the bag. Transport the freshly cleaned equipment in a clean vessel and store in a clean environment.

6 Do not soak the lead weight or the hose clamps in acid.

7 All tubing should be replaced annually. All weights should be rubber coated and any exposed areas should be repaired.

Cleaning procedures for stainless steel – general water sampling

1 Wash with a low residue, non-phosphate detergent (e.g. Contrad, Neutrad or Extran).

2 Rinse thoroughly with de-ionized/RO water.

3 Store in new, clean Ziploc -type plastic bags, and/or cover equipment openings with new Parafilm. Mark the date of cleaning and the initials of the cleaning personnel on the bag. Transport the freshly cleaned equipment in a clean vessel and store in a clean environment.